

## Refine Search

### Search Results -

Terms	Documents
L3 AND (object near distance).ab.	1

**Database:**

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

**Search:**

L6	<input type="button" value="Refine Search"/>	
<input type="button" value="Recall Text"/>	<input type="button" value="Clear"/>	<input type="button" value="Interrupt"/>

### Search History

DATE: Tuesday, September 28, 2004 [Printable Copy](#) [Create Case](#)

**Set Name** Query  
side by side

*DB=USPT; PLUR=NO; OP=OR*

<b>Set Name</b>	<b>Hit Count</b>	<b>Set Name</b>
result set		
<u>L6</u> L3 AND (object near distance).ab.	1	<u>L6</u>
<u>L5</u> L3 AND (object near distance)	46	<u>L5</u>
<u>L4</u> L3 AND calculate	182	<u>L4</u>
<u>L3</u> L2 AND (object OR class)	556	<u>L3</u>
<u>L2</u> L1 AND distance	615	<u>L2</u>
<u>L1</u> 717/103,108.ccls. OR 345/427,586,656,682,764.ccls.	1557	<u>L1</u>

END OF SEARCH HISTORY

## Hit List

[Clear](#) [Generate Collection](#) [Print](#) [Fwd Refs](#) [Blkwd Refs](#)  
[Generate OACs](#)

### Search Results - Record(s) 1 through 11 of 11 returned.

1. Document ID: WO 2079799 A1

L9: Entry 1 of 11

File: EPAB

Oct 10, 2002

PUB-NO: WO002079799A1

DOCUMENT-IDENTIFIER: WO 2079799 A1

TITLE: DISTANCE MEASURING DEVICE, DISTANCE MEASURING EQUIPMENT AND DISTANCE MEASURING METHOD

[Full](#) [Title](#) [Citation](#) [Front](#) [Review](#) [Classification](#) [Date](#) [Reference](#) [Sequences](#) [Attachments](#) [Claims](#) [KMC](#) [Drawn D](#)

2. Document ID: WO 9843111 A1

L9: Entry 2 of 11

File: EPAB

Oct 1, 1998

PUB-NO: WO009843111A1

DOCUMENT-IDENTIFIER: WO 9843111 A1

TITLE: METHOD FOR DETERMINING THE VERTICAL DISTANCE BETWEEN AN OBJECT AND A DEVICE WITH A VARIABLE POSITION

[Full](#) [Title](#) [Citation](#) [Front](#) [Review](#) [Classification](#) [Date](#) [Reference](#) [Sequences](#) [Attachments](#) [Claims](#) [KMC](#) [Drawn D](#)

3. Document ID: FR 2757640 A1

L9: Entry 3 of 11

File: EPAB

Jun 26, 1998

PUB-NO: FR002757640A1

DOCUMENT-IDENTIFIER: FR 2757640 A1

TITLE: Optical measurement system for speed or distance of object

[Full](#) [Title](#) [Citation](#) [Front](#) [Review](#) [Classification](#) [Date](#) [Reference](#) [Sequences](#) [Attachments](#) [Claims](#) [KMC](#) [Drawn D](#)

4. Document ID: EP 793117 A2

L9: Entry 4 of 11

File: EPAB

Sep 3, 1997

PUB-NO: EP000793117A2

DOCUMENT-IDENTIFIER: EP 793117 A2

TITLE: Light wave distance measuring apparatus and method for determining distance of an object

[Full](#) [Title](#) [Citation](#) [Front](#) [Review](#) [Classification](#) [Date](#) [Reference](#) [Sequences](#) [Attachments](#) [Claims](#) [KMC](#) [Drawn D](#)

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 5. Document ID: GB 2269015 A

L9: Entry 5 of 11

File: EPAB

Jan 26, 1994

PUB-NO: GB002269015A

DOCUMENT-IDENTIFIER: GB 2269015 A

TITLE: Apparatus for determining distances or dimensions

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KM/C	Drawn D
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 6. Document ID: WO 9221181 A1

L9: Entry 6 of 11

File: EPAB

Nov 26, 1992

PUB-NO: WO009221181A1

DOCUMENT-IDENTIFIER: WO 9221181 A1

TITLE: DUAL SATELLITE NAVIGATION SYSTEM AND METHOD

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KM/C	Drawn D
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 7. Document ID: WO 9219984 A1

L9: Entry 7 of 11

File: EPAB

Nov 12, 1992

PUB-NO: WO009219984A1

DOCUMENT-IDENTIFIER: WO 9219984 A1

TITLE: APPARATUS FOR LOCATING AN OBJECT, AND LIGHT TRANSMITTER

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KM/C	Drawn D
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 8. Document ID: EP 474067 A2

L9: Entry 8 of 11

File: EPAB

Mar 11, 1992

PUB-NO: EP000474067A2

DOCUMENT-IDENTIFIER: EP 474067 A2

TITLE: Distance detecting apparatus.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KM/C	Drawn D
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 9. Document ID: WO 9108440 A1

L9: Entry 9 of 11

File: EPAB

Jun 13, 1991

PUB-NO: WO009108440A1

DOCUMENT-IDENTIFIER: WO 9108440 A1

TITLE: PROCESS AND DEVICE FOR THE MEASUREMENT OF DISTANCES IN GASES AND LIQUIDS USING ULTRASONICS

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Drawn D
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10. Document ID: EP 419082 A2

L9: Entry 10 of 11

File: EPAB

Mar 27, 1991

PUB-NO: EP000419082A2

DOCUMENT-IDENTIFIER: EP 419082 A2

TITLE: Optical gauging apparatus.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Drawn D
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11. Document ID: DE 3401919 A1

L9: Entry 11 of 11

File: EPAB

Jul 25, 1985

PUB-NO: DE003401919A1

DOCUMENT-IDENTIFIER: DE 3401919 A1

TITLE: Camouflage projector

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Drawn D
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Clear	Generate Collection	Print	Fwd Refs	Blkwd Refs	Generate OACS
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Terms	Documents
L8 AND calculate	11

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# Refine Search

## Search Results -

Terms	Documents
L16 AND (object ADJ model)	1

Database:

US Pre-Grant Publication Full-Text Database  
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Search:

L17

**Refine Search**

**Recall Text**

**Clear**

**Interrupt**

## Search History

DATE: Tuesday, September 28, 2004 [Printable Copy](#) [Create Case](#)

### Set Name Query

side by side

*DB=TDBD; PLUR=NO; OP=OR*

L17 L16 AND (object ADJ model)

1 L17

L16 distance

4278 L16

*DB=JPAB; PLUR=NO; OP=OR*

L15 L14 AND (object ADJ model)

0 L15

L14 L12 AND (distance ADJ object) same calculate

71 L14

L13 L12 AND (distance ADJ object)

2485 L13

L12 L11 AND (object near distance)

3498 L12

L11 L10 AND object

18191 L11

L10 distance

193088 L10

*DB=EPAB; PLUR=NO; OP=OR*

L9 L8 AND calculate

11 L9

L8 L7 AND (object near distance)

364 L8

L7 distance AND object

2902 L7

*DB=USPT; PLUR=NO; OP=OR*

### Hit Count Set Name

result set

<u>L6</u>	L3 AND (object near distance).ab.	1	<u>L6</u>
<u>L5</u>	L3 AND (object near distance)	46	<u>L5</u>
<u>L4</u>	L3 AND calculate	182	<u>L4</u>
<u>L3</u>	L2 AND (object OR class)	556	<u>L3</u>
<u>L2</u>	L1 AND distance	615	<u>L2</u>
<u>L1</u>	717/103,108.ccls. OR 345/427,586,656,682,764.ccls.	1557	<u>L1</u>

END OF SEARCH HISTORY

## Refine Search

### Search Results -

Terms	Documents
L16 AND (object ADJ model)	1

**Database:**

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**Search:**

L17

**Refine Search**

**Recall Text**

**Clear**

**Interrupt**

### Search History

**DATE:** Tuesday, September 28, 2004 [Printable Copy](#) [Create Case](#)

**Set Name** Query  
side by side

**Hit Count** Set Name  
result set

*DB=TDBD; PLUR=NO; OP=OR*

L17 L16 AND (object ADJ model)  
L16 distance

1 L17  
4278 L16

*DB=JPAB; PLUR=NO; OP=OR*

L15 L14 AND (object ADJ model)  
L14 L12 AND (distance ADJ object) same calculate  
L13 L12 AND (distance ADJ object)  
L12 L11 AND (object near distance)  
L11 L10 AND object  
L10 distance

0 L15  
71 L14  
2485 L13  
3498 L12  
18191 L11  
193088 L10

*DB=EPAB; PLUR=NO; OP=OR*

L9 L8 AND calculate  
L8 L7 AND (object near distance)  
L7 distance AND object

11 L9  
364 L8  
2902 L7

*DB=USPT; PLUR=NO; OP=OR*

<u>L6</u>	L3 AND (object near distance).ab.	1	<u>L6</u>
<u>L5</u>	L3 AND (object near distance)	46	<u>L5</u>
<u>L4</u>	L3 AND calculate	182	<u>L4</u>
<u>L3</u>	L2 AND (object OR class)	556	<u>L3</u>
<u>L2</u>	L1 AND distance	615	<u>L2</u>
<u>L1</u>	717/103,108.ccls. OR 345/427,586,656,682,764.ccls.	1557	<u>L1</u>

END OF SEARCH HISTORY

# Hit List

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Generate OACS				

Search Results - Record(s) 1 through 1 of 1 returned.

1. Document ID: NN9505419

L17: Entry 1 of 1

File: TDBD

May 1, 1995

TDB-ACC-NO: NN9505419

DISCLOSURE TITLE: Reducing the Latency of Distributed Resource Registration

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Full	Title	Citation	Front	Review	Classification	Date	Reference	Abstract	Abstract	Claims	KOMC	Draw
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Clear	Generate Collection	Print	Fwd Refs	Bkwd Refs	Generate OACS
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Terms	Documents
L16 AND (object ADJ model)	1

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# Hit List

Clear	Generate Collection	Print	Fwd Refs	Bkwd Refs
Generate OACS				

## Search Results - Record(s) 1 through 46 of 46 returned.

### 1. Document ID: US 6798409 B2

L5: Entry 1 of 46

File: USPT

Sep 28, 2004

US-PAT-NO: 6798409

DOCUMENT-IDENTIFIER: US 6798409 B2

TITLE: Processing of images for 3D display

DATE-ISSUED: September 28, 2004

#### INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Thomas; Graham Alexander	London			GB
Stevens; Richard Fawconer	London			GB

US-CL-CURRENT: 345/427; 345/420, 345/424, 382/154

#### ABSTRACT:

A method and display are disclosed in which a representation of a 3D model is provided for presentation as a 3D image. The image may be presented under an array of spherical or lenticular microlenses so that different images are presented at different viewing angles. The images are rendered using a set of orthographic projections; this can avoid the need for multiple cameras or the highly computer intensive processing associated with generation of simulated camera images and can also give improved results as compared to prior art multiview images.

24 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

Full	Title	Citation	Front	Review	Classification	Date	Reference	Abstract	Claims	KMM	Draw. D
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### 2. Document ID: US 6798408 B2

L5: Entry 2 of 46

File: USPT

Sep 28, 2004

US-PAT-NO: 6798408

DOCUMENT-IDENTIFIER: US 6798408 B2

TITLE: Image generation apparatus, method and recording medium

DATE-ISSUED: September 28, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tokuyama; Katsuya	Tokyo			JP
Kaku; Ryoichi	Tokyo			JP

US-CL-CURRENT: 345/426; 345/427, 345/581, 345/582, 345/589

ABSTRACT:

An image generation apparatus, method and recording medium capable of expressing natural shadows with respect to changes of the motion of the character and creating shadows with less load on the CPU. It is possible to express a natural shadow with respect to changes of a motion of a character by changing density, degree of transparency and scale of a shadow object according to the positional relationship, speed relationship between a three-dimensional body and topographical object or environment surrounding the observing point etc. Even if the character has at least two legs (reference legs) and moves these legs, it is possible to determine the scale of the shadow object after the motion and display the shadow object based on desired reference points. The reference points can be obtained by assigning predetermined weights to a projection point  $P_c$  of a lumbar part  $c$  parallel-projected onto a topographical object, a projection point  $P_a$  corresponding to a right leg  $a$  and a projection point  $P_b$  corresponding to a left leg  $b$ .

37 Claims, 30 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 13

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Claims](#) | [KWMC](#) | [Drawn D](#)

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3. Document ID: US 6674484 B1

L5: Entry 3 of 46

File: USPT

Jan 6, 2004

US-PAT-NO: 6674484

DOCUMENT-IDENTIFIER: US 6674484 B1

TITLE: Video sample rate conversion to achieve 3-D effects

DATE-ISSUED: January 6, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Boland; Liza G.	New York	NY		
Janssen; Johan G.	Ossining	NY		

US-CL-CURRENT: 348/580; 345/427, 345/582, 348/561, 348/565, 348/578, 348/581,  
348/583, 382/294, 382/298

ABSTRACT:

The two dimensional sample rate conversion capabilities of a video display system are used to produce three-dimensional effects. Linear and non-linear scaling is applied to a video image to convey a sense of depth. The three dimensional effects are used to increase the visual appeal of existing and new feature sets in display systems. A multi-faceted object representation, such as a representation of a cube or a pyramid, can be used to display different video images on each facet of the representation. By appropriately scaling each image on each facet, an impression of depth is achieved. The images on the different facets can be selected to represent different aspects of a common theme, such as datacast information related to a primary source of information. Channel changing on a television can be presented as a rotation of the multifaceted object. In like manner, other familiar representations, such as a representation of a book can be used, wherein channel changing is presented as a turning of the pages of the book, each television program being presented on a different page. Advanced features, such as program categorization, can be represented as tabs on the book that facilitate the selection of a particular category. In like manner, a rotation of a multifaceted object about one axis may correspond to a change of channel within a select category, whereas a rotation about another axis may correspond to a change of category. Techniques are presented for achieving these three dimensional effects with calculations that are well suited for execution via the sample rate converters of conventional display systems.

18 Claims, 16 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 7

Full	Title	Citation	Front	Review	Classification	Date	Reference	DOI	Page	Page Range	Claims	IPC	Drawn	Des
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4. Document ID: US 6667750 B1

L5: Entry 4 of 46

File: USPT

Dec 23, 2003

US-PAT-NO: 6667750

DOCUMENT-IDENTIFIER: US 6667750 B1

**TITLE:** Multiple pass layout of graphical objects with elastics

DATE-ISSUED: December 23, 2003

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Halstead, Jr.; Robert H.	Belmont	MA		
Hollingsworth; David E.	Watertown	MA		

US-CL-CURRENT: 345/788; 345/619, 345/660, 345/764, 345/800

**ABSTRACT:**

To process the layout of graphical objects, elastics data structures are established for the graphical objects to define minimum and preferred sizes, stretch properties and compression properties. Composite graphical objects include elastics properties computed from their components through add and max operations which are dependent on relative elasticities of the components. The positions of origins within graphical objects are defined by pairs of elastics in each of two

dimensions. One application of elastics is with respect to text blocks where preferred width and compressibility of each text block is a function of the amount of text in the text block. The elastics and dimensions of graphical objects are processed in a three pass layout negotiation. In the first pass, preferred sizes and elasticities of the graphical objects are computed along a first dimension. In a second pass, size values of the graphical objects along the first dimension are computed from the preferred sizes and elasticities, and preferred sizes and elasticities of the graphical objects along a second dimension are computed based on the size values of the graphical objects along the first dimension. In a final pass, size values of the graphical objects along the second dimension are computed from the preferred sizes and elasticities.

22 Claims, 28 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 11

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [EPOAC](#) | [Draw. D.](#)

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5. Document ID: US 6664971 B1

L5: Entry 5 of 46

File: USPT

Dec 16, 2003

US-PAT-NO: 6664971

DOCUMENT-IDENTIFIER: US 6664971 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Method, system, and computer program product for anisotropic filtering and applications thereof

DATE-ISSUED: December 16, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mukherjee; Shrijeet S.	Mountain View	CA		
Dorbie; Angus M.	Mountain View	CA		

US-CL-CURRENT: 345/582; 345/583, 345/584, 345/585, 345/586, 345/587, 345/588

ABSTRACT:

A first copy of an object is rendered using a texture sample selected from a texture image. This texture sample is selected from the texture image according to a first set of texture coordinates. The rendered object is stored in a frame buffer. Next, a second copy of the object is rendered using a second texture sample selected from the texture image. The second texture sample is selected from the texture image according to a second set of texture coordinates calculated in accordance with the first set of texture coordinates and one or more Jitter factors. The second set of calculated texture coordinates is displaced from the first set of texture coordinates along an axis of anisotropy. This second rendered copy of the object is then blended with the first rendered copy of the object to produce an object with anisotropic filtering. In embodiments of the invention, more than two copies of the object are rendered and blended together to form an object with anisotropic filtering.

20 Claims, 13 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 11

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Search](#) | [Advanced Search](#) | [Claims](#) | [KMC](#) | [Draw. D.](#)

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6. Document ID: US 6624813 B1

L5: Entry 6 of 46

File: USPT

Sep 23, 2003

US-PAT-NO: 6624813

DOCUMENT-IDENTIFIER: US 6624813 B1

TITLE: Three-dimensional graphics processor and its drafting method using parallel scanning lines as processing unit

DATE-ISSUED: September 23, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wang; Tai-Cheng	Hsin-Chu Hsien			TW

US-CL-CURRENT: 345/441; 345/427, 345/428, 345/522, 345/619

ABSTRACT:

The present invention, a three-dimensional graphics processor and its drafting method using parallel scanning lines as processing unit, makes use of a data base memory to completely receive and store the triangle data at a time from the main memory. When it comes to displaying, it uses a horizontal scanning line or a plurality of scanning lines as processing unit to scan in order to search and calculate so as to process its corresponding triangle to make it become pixel. It further stores the pixel directly in the pixel buffer and display the pixel on the display device by accommodating the synchronized signal of the display device. In this way, it can replace the conventional way of using frame as processing unit and having to use a large space of frame buffer and Z-buffer. In addition, its data base memory can also store the 2D sprite, thereby, it not only can speed up the drafting speed of the 3D graphics, but also can achieve the object of integrating the multimedia apparatuses and simplifying the design.

15 Claims, 6 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 6

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Search](#) | [Advanced Search](#) | [Claims](#) | [KMC](#) | [Draw. D.](#)

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7. Document ID: US 6618049 B1

L5: Entry 7 of 46

File: USPT

Sep 9, 2003

US-PAT-NO: 6618049

DOCUMENT-IDENTIFIER: US 6618049 B1

TITLE: Method and apparatus for preparing a perspective view of an approximately spherical surface portion

DATE-ISSUED: September 9, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hansen; Paul Edward	Watsonville	CA		

US-CL-CURRENT: 345/423; 345/427, 345/428, 345/581, 345/586, 345/607

ABSTRACT:

A computer system (10) can prepare and present on a display (22) a two-dimensional image that includes a perspective view, from a selected eyepoint (71, 152), of an object (23) which is a three-dimensional object of an approximately spherical shape, such as the earth. The system maintains image information for the object at each of several different resolution levels, portions of which are selected and mapped into the perspective view for respective portions of the surface of the object. In order to determine what resolution level to use for a given section of the surface of the object, the system relies on a combination of a logarithm of the square of a distance from the eyepoint to a point on the surface section, and a logarithm of the square of the degree of tilt of the surface section in relation to the eyepoint. In order to determine how far to conceptually tessellate or subdivide the surface of the object, the system relies on the logarithm of the square of the distance from the eyepoint to the point on the surface section.

20 Claims, 15 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 7

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [KOMC](#) | [Drawings](#)

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8. Document ID: US 6570566 B1

L5: Entry 8 of 46

File: USPT

May 27, 2003

US-PAT-NO: 6570566

DOCUMENT-IDENTIFIER: US 6570566 B1

TITLE: Image processing apparatus, image processing method, and program providing medium

DATE-ISSUED: May 27, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yoshigahara; Takayuki	Tokyo			JP

US-CL-CURRENT: 345/427; 345/7, 345/8, 345/9, 348/42, 348/47, 359/17, 359/234

ABSTRACT:

An image displaying configuration is arranged so that objects and scenes at the distance of the fixation point are images in focus, and objects and scenes at distances other than the distance of the fixation point are subjected to out-of-focus processing according to the distance from the fixation point, based on the fixation point position information for both right and left eyes, and based on the distance information of the shown image, whereby an image is shown. This configuration allows three-dimensional images with a sensation closer to real space to be shown, thus providing for an image processing apparatus and image processing method capable of three-dimensional images with increased sensations of reality.

33 Claims, 17 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 13

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [EPOC](#) | [Draw. D.](#)

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9. Document ID: US 6535232 B1

L5: Entry 9 of 46

File: USPT

Mar 18, 2003

US-PAT-NO: 6535232

DOCUMENT-IDENTIFIER: US 6535232 B1

TITLE: Device for controlling quality of reproduction of motion picture and method for controlling the same

DATE-ISSUED: March 18, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tsuda; Kenjiro	Hirakata			JP
Nishigori; Yoshihisa	Ikeda			JP
Inagaki; Satoru	Suita			JP
Miki; Takayasu	Hirakata			JP
Sogo; Yoshimasa	Osaka			JP
Nakase; Yoshimori	Kawachinagano			JP
Yoneyama; Akira	Higashiosaka			JP
Nakano; Hironori	Katano			JP
Imamura; Tetsuya	Osaka			JP

US-CL-CURRENT: 345/849; 345/427, 345/428, 345/583, 345/638, 345/848

ABSTRACT:

An apparatus comprises an object generation unit for generating an object based on three-dimensional object data externally input, an object position determination unit that moves the generated object according to a user input, and thereby determines an object position, a view point position determination unit that moves a view point according to the user input and thereby determines a view point position, a distance calculation unit for calculating a distance from the object

position and the view point position, a frame rate determination unit for determining a frame rate corresponding to the calculated distance on the basis of a set table or formula, and a frame rate control unit and a moving image generation unit for reproducing the moving image with the frame rate of moving image data externally input reduced.

20 Claims, 16 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [KWMC](#) | [Draw. D.](#)

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10. Document ID: US 6512518 B2

L5: Entry 10 of 46

File: USPT

Jan 28, 2003

US-PAT-NO: 6512518

DOCUMENT-IDENTIFIER: US 6512518 B2

TITLE: Integrated system for quickly and accurately imaging and modeling three-dimensional objects

DATE-ISSUED: January 28, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dimsdale; Jerry	Berkeley	CA		

US-CL-CURRENT: 345/427

ABSTRACT:

An integrated system generates a model of a three-dimensional object. A scanning laser device scans the three-dimensional object and generates a point cloud. The points of the point cloud each indicate a location of a corresponding point on a surface of the object. A first model is generated, responsive to the point cloud, that generates a first model representing constituent geometric shapes of the object. A data file is generated, responsive to the first model, that can be inputted to a computer-aided design system.

1 Claims, 49 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 44

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [KWMC](#) | [Draw. D.](#)

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11. Document ID: US 6510244 B2

L5: Entry 11 of 46

File: USPT

Jan 21, 2003

US-PAT-NO: 6510244

DOCUMENT-IDENTIFIER: US 6510244 B2

TITLE: Method and system for acquiring a three-dimensional shape description

DATE-ISSUED: January 21, 2003

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Proesmans; Marc R. A. B.	Lede			BE
Van Gool; Luc S. J.	Antwerpen			BE
Oosterlinck; Andre J. J.	Lovenjoel			BE
Defoort; Filip P.	Zwevegem			BE

US-CL-CURRENT: 382/203, 345/419, 345/424, 345/427, 348/42, 348/44, 356/12, 356/13,  
382/151, 382/154, 382/204, 382/206, 382/276, 382/291 ..

## ABSTRACT:

Method for acquiring a three-dimensional shape or image of a scene, wherein a predetermined pattern of lines is projected onto the scene and the shape is acquired on the basis of relative distances between the lines and/or intersections of the lines of the pattern.

57 Claims, 35 Drawing figures

Exemplary Claim Number: 34

Number of Drawing Sheets: 12

Full Title Citation Front Review Classification Date Reference Subjects Claims IOMC Drawn By

12. Document ID: US 6504544 B1

L5: Entry 12 of 46

File: USPT

Jan 7, 2003

US-PAT-NO: 6504544

DOCUMENT-IDENTIFIER: US 6504544 B1

## TITLE: Processing layout of text graphical objects

DATE-ISSUED: January 7, 2003

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hollingsworth; David E.	Watertown	MA		
Halstead, Jr.; Robert H.	Belmont	MA		

US-CL-CURRENT: 345/467; 345/764, 345/788, 345/800

## **ABSTRACT:**

To process the layout of graphical objects, elastics data structures are established for the graphical objects to define minimum and preferred sizes.

stretch properties and compression properties. Composite graphical objects include elastics properties computed from their components through add and max operations which are dependent on relative elasticities of the components. The positions of origins within graphical objects are defined by pairs of elastics in each of two dimensions. One application of elastics is with respect to text blocks where preferred width and compressibility of each text block is a function of the amount of text in the text block. The elastics and dimensions of graphical objects are processed in a three pass layout negotiation. In the first pass, preferred sizes and elasticities of the graphical objects are computed along a first dimension. In a second pass, size values of the graphical objects along the first dimension are computed from the preferred sizes and elasticities, and preferred sizes and elasticities of the graphical objects along a second dimension are computed based on the size values of the graphical objects along the first dimension. In a final pass, size values of the graphical objects along the second dimension are computed from the preferred sizes and elasticities.

21 Claims, 29 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 11

Full Title Citation Front Review Classification Date Reference   <img alt

13. Document ID: US 6504539 B1

L5: Entry 13 of 46

File: USPT

Jan 7, 2003

US-PAT-NO: 6504539

DOCUMENT-IDENTIFIER: US 6504539 B1

**TITLE:** Method for displaying an object in three-dimensional game

DATE-ISSUED: January 7, 2003

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hiraki; Yoshikazu	Osaka			JP

US-CL-CURRENT: 345/427

## ABSTRACT:

This invention allows a player to perform and enjoy shooting operations without any deterioration of three-dimensional display by displaying an enemy object in the field of view of the player when the player object and the enemy object are within a predetermined distance from each other. A game calculating means 200 performs a calculation to determine the position of the player object based on operation information from an operating means 100. When the enemy object is present within the predetermined distance from the position of the player object, a virtual camera control means 400 sets a virtual camera such that it pursues the enemy object and such that the player object is present in the field of view to generate a field image as viewed from the virtual camera.

19 Claims, 26 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 15

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Text Search](#) | [Image Search](#) | [Advanced Search](#) | [Claims](#) | [KIMC](#) | [Drawn D...](#)

14. Document ID: US 6476813 B1

L5: Entry 14 of 46

File: USPT

Nov 5, 2002

US-PAT-NO: 6476813

DOCUMENT-IDENTIFIER: US 6476813 B1

TITLE: Method and apparatus for preparing a perspective view of an approximately spherical surface portion

DATE-ISSUED: November 5, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hansen; Paul Edward	Watsonville	CA		

US-CL-CURRENT: 345/427; 345/423, 345/428, 345/581, 345/582

ABSTRACT:

A computer system (10) can prepare and present on a display (22) a two-dimensional image that includes a perspective view, from a selected eyepoint (71, 152), of an object (23) which is a three-dimensional object of an approximately spherical shape, such as the earth. The system maintains image information for the object at each of several different resolution levels, portions of which are selected and mapped into the perspective view for respective portions of the surface of the object. In order to determine what resolution level to use for a given section of the surface of the object, the system relies on a combination of a logarithm of the square of a distance from the eyepoint to a point on the surface section, and a logarithm of the square of the degree of tilt of the surface section in relation to the eyepoint. In order to determine how far to conceptually tessellate or subdivide the surface of the object, the system relies on the logarithm of the square of the distance from the eyepoint to the point on the surface section.

24 Claims, 15 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 7

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Text Search](#) | [Image Search](#) | [Advanced Search](#) | [Claims](#) | [KIMC](#) | [Drawn D...](#)

15. Document ID: US 6476812 B1

L5: Entry 15 of 46

File: USPT

Nov 5, 2002

US-PAT-NO: 6476812

DOCUMENT-IDENTIFIER: US 6476812 B1

TITLE: Information processing system, information processing method, and supplying medium

DATE-ISSUED: November 5, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yoshigahara; Takayuki	Tokyo			JP
Yokoyama; Atsushi	Kanagawa			JP

US-CL-CURRENT: 345/427; 345/473, 345/958, 463/31

ABSTRACT:

An information processing system for processing three-dimensional information on an object existing actually in a three-dimensional space for detecting a collision between a space having an optional configuration and size in the three-dimensional space and the object. In the information processing system, a virtual space setting section sets a virtual space in the three-dimensional space, and a three-dimensional information creating section creates three-dimensional information on the object such as an intruder. A decision is made, on the basis of the three-dimensional information on the object, on whether or not the collision between the intruder and the virtual space occurs.

31 Claims, 29 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 24

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Assignee](#) | [Attorney](#) | [Claims](#) | [KWMC](#) | [Drawn](#)

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16. Document ID: US 6473093 B1

L5: Entry 16 of 46

File: USPT

Oct 29, 2002

US-PAT-NO: 6473093

DOCUMENT-IDENTIFIER: US 6473093 B1

TITLE: Processing of graphical objects with distinct stretch and compression properties

DATE-ISSUED: October 29, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Halstead, Jr.; Robert H.	Belmont	MA		
Hollingsworth; David E.	Watertown	MA		

US-CL-CURRENT: 345/619; 345/764, 345/781, 345/800

ABSTRACT:

To process the layout of graphical objects, elastics data structures are

established for the graphical objects to define minimum and preferred sizes, stretch properties and compression properties. Composite graphical objects include elastics properties computed from their components through add and max operations which are dependent on relative elasticities of the components. The positions of origins within graphical objects are defined by pairs of elastics in each of two dimensions. One application of elastics is with respect to text blocks where preferred width and compressibility of each text block is a function of the amount of text in the text block. The elastics and dimensions of graphical objects are processed in a three pass layout negotiation. In the first pass, preferred sizes and elasticities of the graphical objects are computed along a first dimension. In a second pass, size values of the graphical objects along the first dimension are computed from the preferred sizes and elasticities, and preferred sizes and elasticities of the graphical objects along a second dimension are computed based on the size values of the graphical objects along the first dimension. In a final pass, size values of the graphical objects along the second dimension are computed from the preferred sizes and elasticities.

29 Claims, 28 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Journal	Volume	Page	Claims	ICMC	Drawn
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17. Document ID: US 6466208 B1

L5: Entry 17 of 46

File: USPT

Oct. 15, 2002

US-PAT-NO: 6466208

DOCUMENT-IDENTIFIER: US 6466208 B1

TITLE: Apparatus and method for adjusting 3D stereo video transformation

DATE-ISSUED: October 15, 2002

**INVENTOR—INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yet; Kwo-Woei	Hsinchu			TW
Lee; Ruen-Rone	Hsinchu			TW

US-CL-CURRENT: 345/427; 345/419

## ABSTRACT:

The present invention discloses an apparatus and method for adjusting 3D transformation applied in a 3D computer graphic processing system, using a simple and practical computing method to simulate visual effect of human's eyes to separate input video into a left video and a right video. By the focus effect of the left video and the right video, a user can feel effect of changing depth of the input video, and creating 3D effect. Additionally, the present invention provides many parameters for convenience in adjusting the video depth and location in a display plane by users.

## 6 Claims, 9 Drawing figures

Exemplary Claim Number: 3

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18. Document ID: US 6414677 B1

L5: Entry 18 of 46

File: USPT

Jul 2, 2002

US-PAT-NO: 6414677

DOCUMENT-IDENTIFIER: US 6414677 B1

TITLE: Methods, apparatus and data structures for providing a user interface, which exploits spatial memory in three-dimensions, to objects and which visually groups proximally located objects.

DATE-ISSUED: July 2, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Robertson; George G.	Seattle	WA		
Robbins; Daniel C.	Seattle	WA		
Van Dantzich; Maarten Roderik	Seattle	WA		

US-CL-CURRENT: 345/419; 345/764, 345/848

ABSTRACT:

A graphical user interface in which object thumbnails are rendered on a simulated three-dimensional surface which (i) exploits spatial memory and (ii) allows more objects to be rendered on a given screen. The objects may be moved, continuously, on the surface with a two-dimensional input device.

17 Claims, 69 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 62

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19. Document ID: US 6373508 B1

L5: Entry 19 of 46

File: USPT

Apr 16, 2002

US-PAT-NO: 6373508

DOCUMENT-IDENTIFIER: US 6373508 B1

TITLE: Method and system for manipulation of objects in a television picture

DATE-ISSUED: April 16, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Moengen; Harald K.	Oslo			NO

US-CL-CURRENT: 345/848; 342/453, 345/419, 345/427, 345/632, 345/726, 345/849,  
348/157, 348/25, 473/415

## ABSTRACT:

In a method for manipulation of a movable object displayed in a television picture, the distance between the object and fixed basic positions is detected at a time  $t$  together with the distance between the object and a television camera in a known position. The object's position is converted to a position  $X, Y$  in the television camera's picture plane, generating therein a synthetic object which overlays the movable object and represents it in the television picture. In a method for generating a synthetic track which represents the path of a movable object displayed in television pictures during a period  $\theta$ , the path of the object is calculated on the basis of its detected positions, and these positions are used for generating a synthetic track which is displayed in a television picture in order to represent the path of the object in the period  $T$ .

20 Claims, 22 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

Full Title Citation Front Review Classification Date Reference Authors Abstracts Claims IOMC Drama Details

20. Document ID: US 6327097 B1

L5: Entry 20 of 46

File: USPT

Dec 4, 2001

US-PAT-NO: 6327097

DOCUMENT-IDENTIFIER: US 6327097 B1

## TITLE: Optical imaging system and graphic user interface

DATE-ISSUED: December 4, 2001

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rybaczynski, Zbigniew	Koln			DE

US-CL-CURRENT: 359/676; 345/427, 348/218.1, 359/664

## ABSTRACT:

The invention relates to an optical imaging system for imaging an object with progressively adjustable magnification. The inventive system comprises an imaging plane for projecting an image field originating from the object and an imaging optical system situated on the object side in front of the imaging plane, preferably with a fixed focal length for producing the image field on the imaging plane. Said imaging optical system and/or said imaging plane are arranged so that they can move in the direction of the optical axis in order to adjust the magnification and/or focus the image appearing on the imaging plane. A first

optical element which receives optical radiation through a wide angle is provided on the object side in front of the imaging optical system to select and/or transmit those light beams originating from the object, said light beams running through a predetermined focal point or nodal point, and a second optical element is positioned between the first optical element and the imaging optical system in such a way that the light beams running through the predetermined focal or nodal point produce an image of the object in an intermediate image plane. This image can then be projected by the imaging optical system into the imaging plane in various sizes in such a way as to produce an image field with varying magnification in the area of the imaging plane.

11 Claims, 23 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 20

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Cited References](#) | [Claims](#) | [KOMC](#) | [Draw D](#)

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21. Document ID: US 6271854 B1

L5: Entry 21 of 46

File: USPT

Aug 7, 2001

US-PAT-NO: 6271854

DOCUMENT-IDENTIFIER: US 6271854 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and apparatus for facilitating navigation in three-dimensional graphic scenes

DATE-ISSUED: August 7, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Light; John J.	Hillsboro	OR		

US-CL-CURRENT: 345/427; 345/157

ABSTRACT:

A method and apparatus for facilitating navigation in three-dimensional graphics scenes. As a user changes from one viewing position to another within these 3D scenes, an opportunistic control button is displayed on the computer screen for selection via a user-input device, such as a mouse. Selection of this control button enables the user to assume the viewing position that was observed immediately preceding the user's current viewing position. In one embodiment, the control button appears on the display directly under the cursor (i.e., mouse pointer) at the time that the current viewing position appears, regardless of where the cursor is located on the screen. Advantageously, the user is able to assume previously viewed positions within 3D scenes with relative ease.

15 Claims, 9 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 7

22. Document ID: US 6262743 B1

L5: Entry 22 of 46

File: USPT

Jul 17, 2001

US-PAT-NO: 6262743

DOCUMENT-IDENTIFIER: US 6262743 B1

TITLE: Autostereoscopic image acquisition method and system

DATE-ISSUED: July 17, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Allio; Pierre	Paris			FR

US-CL-CURRENT: 345/427; 345/6, 348/59

ABSTRACT:

The invention relates to a method of acquiring simulated autostereoscopic video images of a scene to be viewed. On the basis of stored data containing three-dimensional information, it implements n simulated cameras, with n >= 3, each generating an image of a scene on a given optical axis. The optical axes of the simulated cameras converge at a point situated at the same distance D from the simulated cameras. The scene to be viewed has a nearest point P.sub.p and a farthest point P.sub.e, and the inter-camera distance and the distance D.sub.min between the simulated cameras and the nearest point P.sub.p are selected in such a manner that for focus varying between the nearest point P.sub.p and the farthest point P.sub.e the angle 2.alpha. between two adjacent simulated cameras varies between a value not greater than 4.5.degree. for the point P.sub.p and a value not less than 0.2.degree. for the point P.sub.e.

18 Claims, 11 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

23. Document ID: US 6243093 B1

L5: Entry 23 of 46

File: USPT

Jun 5, 2001

US-PAT-NO: 6243093

DOCUMENT-IDENTIFIER: US 6243093 B1

TITLE: Methods, apparatus and data structures for providing a user interface, which exploits spatial memory in three-dimensions, to objects and which visually groups matching objects

DATE-ISSUED: June 5, 2001

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Czerwinski; Mary	Woodinville	WA		
Dumais; Susan T.	Kirkland	WA		
Dziadosz; Susan E.	Ann Arbor	MI		
Robertson; George G.	Seattle	WA		
Robbins; Daniel C.	Seattle	WA		
van Dantzich; Maarten Roderik	Seattle	WA		

US-CL-CURRENT: 345/848; 345/764, 345/853

**ABSTRACT:**

A graphical user interface in which object thumbnails are rendered on a simulated three-dimensional surface which (i) exploits spatial memory and (ii) allows more objects to be rendered on a given screen. The objects may be moved, continuously, on the surface with a two-dimensional input device. Furthermore, the interface determines a degree to which each such object is related, either through similarity or matching, to other such objects and displays an appropriate cue proximate to and associated with the former object to visually signify this degree.

13 Claims, 69 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 62

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Claims](#) | [KOMC](#) | [Draw. D.](#)

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**□ 24. Document ID: US 6188405 B1**

L5: Entry 24 of 46

File: USPT

Feb 13, 2001

US-PAT-NO: 6188405

DOCUMENT-IDENTIFIER: US 6188405 B1

\*\* See image for Certificate of Correction \*\*

TITLE: Methods, apparatus and data structures for providing a user interface, which exploits spatial memory, to objects

DATE-ISSUED: February 13, 2001

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Czerwinski; Mary	Woodinville	WA		
Dumais; Susan T.	Kirkland	WA		
Dziadosz; Susan E.	Ann Arbor	MI		
Robbins; Daniel C.	Seattle	WA		
Robertson; George G.	Seattle	WA		
Thiel; David D.	Redmond	WA		
Van Dantzich; Maarten	Seattle	WA		

US-CL-CURRENT: 345/764; 345/968

**ABSTRACT:**

A graphical user interface in which object thumbnails, as scaled images, are rendered on a two-dimensional wall or screen, and which exploits spatial memory. The objects may be moved, continuously, on the surface with a two-dimensional input device. Pop-up title bars may be rendered over active objects. Intelligent help may be provided to the user, as visual indicators, based on proximity clustering or based on matching algorithms.

63 Claims, 45 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 41

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Claims](#) | [KOMC](#) | [Drawn D.](#)

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25. Document ID: US 6169552 B1

L5: Entry 25 of 46

File: USPT

Jan 2, 2001

US-PAT-NO: 6169552

DOCUMENT-IDENTIFIER: US 6169552 B1

TITLE: Map display device, navigation device and map display method

DATE-ISSUED: January 2, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Endo; Yoshinori	Ibaraki-ken			JP
Okude; Mariko	Ibaraki-ken			JP

US-CL-CURRENT: 345/427; 345/419, 345/421, 345/581

**ABSTRACT:**

There is provided a map display device and a navigation device for displaying a three-dimensional map in which information which is originally hidden can be displayed on a display frame (screen). The map display device (navigation device) includes a map storing unit for storing three-dimensional data of each map constituent, and a map display unit for forming a three-dimensional bird's-eye view map which is obtained by projecting onto the plane from a desired view point each map constituent which is specified by the three-dimensional data stored in the map storing unit, and displaying the three-dimensional bird's-eye view map thus formed on a display frame (screen). When information which is requested to be displayed by a user is hidden by another map constituent located in front of the information and thus is not originally displayed on the three-dimensional bird's-eye view map, the map display unit changes a projection mode for projecting the information or the other map constituent on the plane so that the information is displayed on the display frame.

38 Claims, 84 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 55

26. Document ID: US 6166738 A

L5: Entry 26 of 46

File: USPT

Dec 26, 2000

US-PAT-NO: 6166738

DOCUMENT-IDENTIFIER: US 6166738 A

\*\* See image for Certificate of Correction \*\*

**TITLE:** Methods, apparatus and data structures for providing a user interface, which exploits spatial memory in three-dimensions, to objects

DATE-ISSUED: December 26, 2000

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Robertson; George G.	Seattle	WA		
Robbins; Daniel C.	Seattle	WA		
Van Dantzich; Maarten Roderik	Seattle	WA		

US-CL-CURRENT: 345/839; 345/427, 345/848, 345/854

## ABSTRACT:

A graphical user interface in which object thumbnails are rendered on a simulated three-dimensional surface which (i) exploits spatial memory and (ii) allows more objects to be rendered on a given screen. The objects may be moved, continuously, on the surface with a two-dimensional input device.

35 Claims, 67 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 62

27. Document ID: US 6097394 A

L5: Entry 27 of 46

File: USPT

Aug 1, 2000

US-PAT-NO: 6097394

DOCUMENT-IDENTIFIER: US 6097394 A

TITLE: Method and system for light field rendering

DATE-ISSUED: August 1, 2000

INVENTOR-INFORMATION:

Levoy; Marc Stanford CA  
Hanrahan; Pat Portola Valley CA

US-CL-CURRENT: 345/419; 345/426, 345/427, 382/154

## ABSTRACT:

Described is a simple and robust method and system for generating new views from arbitrary camera positions without depth information or feature matching, simply by combining and resampling the available images. This technique interprets input images as two-dimensional slices of a four dimensional function--the light field. This function completely characterizes the flow of light through unobstructed space in a static scene with fixed illumination. A sampled representation for light fields allows for both efficient creation and display of inward and outward looking views. Light fields may be created from large arrays of both rendered and digitized image. The latter are acquired with a video camera mounted on a computer-controlled gantry. Once a light field has been created, new views may be constructed in real time by extracting slices in appropriate directions. Also described is a compression system that is able to compress generated light fields by more than a factor of 100:1 with very little loss of fidelity. Issues of antialiasing during creation and resampling during slice extraction are also addressed.

27 Claims, 29 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 12

Full	Title	Citation	Front	Review	Classification	Date	Reference	Abstracts	Keywords	Claims	EDOC	Draws
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28. Document ID: US 6078329 A

L5: Entry 28 of 46

File: USPT

Jun 20, 2000

US-PAT-NO: 6078329

DOCUMENT-IDENTIFIER: US 6078329 A

\*\* See image for Certificate of Correction \*\*

**TITLE:** Virtual object display apparatus and method employing viewpoint updating for realistic movement display in virtual reality

DATE-ISSUED: June 20, 2000

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Umeki; Naoko	Kanagawa-ken			JP
Doi; Miwako	Kanagawa-ken			JP

US-CL-CURRENT: 345/419; 345/427

## ABSTRACT:

A virtual object display apparatus displays an object moved in three-dimensional virtual space. A key frame memory section previously stores move

data of each part of the object by unit of action of the object's movement in three-dimensional virtual space. A swing calculation section calculates the change of a basis point of the object by unit of action according to the move data of each part of the object. A display position set section calculates the change of display position corresponding to the change of the basis point in three-dimensional virtual space by unit of action. A display section displays the object movement in three-dimensional virtual space according to the display position by unit of action.

20 Claims, 22 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 19

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Claims](#) | [KMC](#) | [Drawn D.](#)

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29. Document ID: US 6014145 A

L5: Entry 29 of 46

File: USPT

Jan 11, 2000

US-PAT-NO: 6014145

DOCUMENT-IDENTIFIER: US 6014145 A

TITLE: Navigation with optimum viewpoints in three-dimensional workspace interactive displays having three-dimensional objects with collision barriers

DATE-ISSUED: January 11, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bardon; Didier Daniel Claude	Austin	TX		
Berry; Richard Edmond	Georgetown	TX		
Isensee; Scott Harlan	Georgetown	TX		
Martin; Shirley Lynn	Austin	TX		

US-CL-CURRENT: 345/427; 345/474

ABSTRACT:

In a data processor controlled display system having three-dimensional objects laid out in a three-dimensional virtual workspace, the objects have associated therewith respective collision barriers which are stored with their corresponding objects. Then during navigation via changing the user's viewpoint in to the workspace, when this changing viewpoint encounters any collision barrier which is offset from its object by a selected distance D, the viewpoint stops. This distance of the barrier from the object is selected so as to stop the viewpoint at a distance sufficiently removed from its particular object so as to leave the user or viewer with a view of the workspace of sufficient scope to permit the viewer to select a different navigation path or path branch. In accordance with a further aspect of the present invention, the viewpoint is optionally provided with a similar collision barrier.

23 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Text Search](#) | [Image Search](#) | [Advanced Search](#) | [Claims](#) | [KIMC](#) | [Drawn D...](#)

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30. Document ID: US 5929853 A

L5: Entry 30 of 46

File: USPT

Jul 27, 1999

US-PAT-NO: 5929853

DOCUMENT-IDENTIFIER: US 5929853 A

TITLE: Simulating display of on-screen objects in three dimensions

DATE-ISSUED: July 27, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Guha; Ramanathan V.	Los Altos	CA		

US-CL-CURRENT: 345/764

ABSTRACT:

Methods, apparatus and computer program products display hierarchically arranged objects to simulate the display of objects in three dimensions. Objects in the same level of the hierarchy are displayed in a size different from objects on other levels of the hierarchy to simulate the objects on each level being on a different plane, one behind another. Each object's child objects are displayed clustered around the projection of the object into the plane of the child objects, to graphically display the parent-child relationship.

20 Claims, 13 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 12

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Text Search](#) | [Image Search](#) | [Advanced Search](#) | [Claims](#) | [KIMC](#) | [Drawn D...](#)

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31. Document ID: US 5905503 A

L5: Entry 31 of 46

File: USPT

May 18, 1999

US-PAT-NO: 5905503

DOCUMENT-IDENTIFIER: US 5905503 A

TITLE: Rendering an image using lookup tables giving illumination values for each light source by direction and distance

DATE-ISSUED: May 18, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Penna; David E.	Redhill			GB

US-CL-CURRENT: 345/426; 345/427

ABSTRACT:

A 3-D image synthesis apparatus maintains an "object database" (OBJ) defining a 3-D world to be represented on a 2-D display screen (DIS). The object database includes light sources (LS) which have non-uniform distributions of illumination. To simplify calculations of the illumination of an object surface (P<sub>sub.0</sub>), the apparatus pre-stores (606) one or more look-up tables. The look-up table (606) is then addressed by polar coordinates (.theta.,.phi.) calculated per pixel of the output image, to incorporate the dependency of illumination on direction. Several tables may be stored for each light source, each representing the illumination pattern at a different distance (D) from the light source. Smooth variations can be achieved by interpolation between integer values of .theta.,.phi. and D.

12 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [KWMC](#) | [Draw. D.](#)

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32. Document ID: US 5808613 A

L5: Entry 32 of 46

File: USPT

Sep 15, 1998

US-PAT-NO: 5808613

DOCUMENT-IDENTIFIER: US 5808613 A

TITLE: Network navigator with enhanced navigational abilities

DATE-ISSUED: September 15, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Marrin; Christopher F.	Fremont	CA		
Carey; Richard	Los Altos	CA		
Myers; Robert K.	Santa Cruz	CA		

US-CL-CURRENT: 345/850; 345/427, 345/856, 715/501.1

ABSTRACT:

A browser for allowing a user to navigate in a three-dimensional world having a plurality of objects provides enhanced navigational capabilities. The browser allows the user to seek to an object or location in the world, navigate throughout the world using cursor inputs and select an object to follow links associated with that object. The browser differentiates between a seek command, a select command and a travel command entered by the user via a pointing device to provide the three navigational capabilities without requiring the user to change a navigational mode of the browser. A traveler viewer allows the user to travel throughout the three-

dimensional world using pointing device inputs such as single click inputs, double click inputs and click and drag inputs. An examiner viewer allows the user to examine a three-dimensional object by rotating the object, zooming in and out on the object, translating the object in the x and y direction and following links associated with the object or a portion thereof.

39 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 10

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Text Search](#) | [Image Search](#) | [Claims](#) | [KIMC](#) | [Drawn D](#)

33. Document ID: US 5777623 A

L5: Entry 33 of 46

File: USPT

Jul 7, 1998

US-PAT-NO: 5777623

DOCUMENT-IDENTIFIER: US 5777623 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Apparatus and method for performing perspectively correct interpolation in computer graphics in a variable direction along a line of pixels

DATE-ISSUED: July 7, 1998

INVENTOR-INFORMATION:

NAME

Small; Jonathan Andrew Stanley

CITY

Buryfields

STATE

ZIP CODE

COUNTRY

GB3

US-CL-CURRENT: 345/586

ABSTRACT:

In an apparatus and method for performing perspectively correct interpolation of texture coordinates in computer graphics, an incremental interpolation technique is used to calculate pixel values along a display line from an associated texture map. In order to evaluate divisions within the hyperbolic equations relating the texture coordinates to pixel position, the incremental technique performs a log subtraction in which the log of the fractional part of a number is looked-up, while the exponent part of the number is tracked separately. The differential of each texture coordinate is tracked. Further, the incremental technique is arranged so as to render the pixels either from left to right or from right to left depending upon which edge of the polygon being rendered is closer to the viewer and hence at which of the polygon edges accumulated errors will be most visible.

41 Claims, 21 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 19

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Text Search](#) | [Image Search](#) | [Claims](#) | [KIMC](#) | [Drawn D](#)

34. Document ID: US 5774122 A

L5: Entry 34 of 46

File: USPT

Jun 30, 1998

US-PAT-NO: 5774122  
DOCUMENT-IDENTIFIER: US 5774122 A

TITLE: Method for visual programming with aid of animation

DATE-ISSUED: June 30, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kojima; Keiji	Pittsburgh	PA		
Matsuda; Yoshiki	Kokubunji			JP
Futatsugi; Seiji	Inagi			JP

US-CL-CURRENT: 345/848; 345/419, 345/427, 345/763, 345/775, 345/836, 345/839,  
345/967, 345/976

ABSTRACT:

A program making method includes the steps of displaying figures representative of a plurality of objects, inputting a command train which includes a plurality of processing commands each designating at least one of the objects and a processing to be executed for that object and forms a program to be made, executing each processing command so that a processing designated by that command is executed for example data of an object designated by the command each time the command is inputted, and changing the display of a figure representative of an object by each of at least some of the processing commands by processing figure data concerning the figure when that command has been executed. Another program making method includes the steps of displaying figures which represent a plurality of objects and a figure for program to which a program to be made is allotted, inputting a command train which includes a plurality of processing commands each instructing one of the objects to execute at least one processing and forms the program to be made, and changing the display of the figure for program in the vicinity of a point of time of the input of each processing command so that a figure representative of one object designated by that command can be discriminated.

10 Claims, 72 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 44

Full  Title  Citation  Front  Review  Classification  Date  Reference  Drawings  Abstract  Claims  KWMC  Drawn

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35. Document ID: US 5742749 A

L5: Entry 35 of 46

File: USPT

Apr 21, 1998

US-PAT-NO: 5742749  
DOCUMENT-IDENTIFIER: US 5742749 A

TITLE: Method and apparatus for shadow generation through depth mapping

DATE-ISSUED: April 21, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Foran; James L.	Milpitas	CA		
van Widenfelt; Rolf A.	San Francisco	CA		

US-CL-CURRENT: 345/426; 345/586

ABSTRACT:

A method and apparatus for creating shadowed scenes for interactive image generation. Shadowing is effected by generation of a shadowing coefficient for each pixel, which is then used when the scene is rendered. The present invention utilizes z-buffer and projective texture mapping facilities of an image generation system. Generation of the shadow coefficient is achieved by the steps of: rendering the scene from the viewpoint of a light source using z-buffering to create a two dimensional depth map from said z-buffer; storing the depth map in texture mapping storage; rendering the scene from the viewpoint of the viewer; for every pixel in view creating an index info said depth map and a iterated depth value; retrieving a predetermined number of depth map samples from the depth map based on the position of a depth map index; comparing said iterated depth value with each of the depth map samples to determine which of the depth map samples are in shadow; creating a weighted average shadow coefficient from the results of the comparisons; and using the shadow coefficient for rendering. Optionally, the values in the depth map are offset by an amount dependent on the slope of the distance function relative to the depth map indices. The scene is then rendered utilizing surfaces and/or shading information. The shadow coefficient is used to calculate the pixel intensity thus creating realistic shadow effect.

26 Claims, 12 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 10

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Search](#) | [Edit](#) | [Claims](#) | [RWD](#) | [Drawn](#)

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36. Document ID: US 5739820 A

L5: Entry 36 of 46

File: USPT

Apr 14, 1998

US-PAT-NO: 5739820

DOCUMENT-IDENTIFIER: US 5739820 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and apparatus for specular reflection shading of computer graphic images

DATE-ISSUED: April 14, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lyon; Richard F.	Los Altos	CA		

ABSTRACT:

A method and system for approximating a Phong shading calculation for 3D renderings of realistic graphic images. The new method uses only a modest number of multiplies and adds to approximate a calculation that required divides, square roots and powers. The approximation uses approximate normalization, vector differences, and a shape function to simplify the processing and to improve performance significantly while still generating a graphic rendering that is very realistic.

6 Claims, 16 Drawing figures

Exemplary Claim Number: 5

Number of Drawing Sheets: 14

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Search](#) | [Advanced Search](#) | [Claims](#) | [KOMC](#) | [Draw. D.](#)

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37. Document ID: US 5651676 A

L5: Entry 37 of 46

File: USPT

Jul 29, 1997

US-PAT-NO: 5651676

DOCUMENT-IDENTIFIER: US 5651676 A

TITLE: Method of organizing and storing simulated scenery in a flight simulation system

DATE-ISSUED: July 29, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Artwick; Bruce Arthur	Champaign	IL		

US-CL-CURRENT: 434/43; 345/427, 434/307R, 434/38

ABSTRACT:

The present invention is an improved flight simulation system. The system organizes data based upon a predetermined number of object types. Each scenery file is divided to separate the data for each object type. Object data is sub-divided into latitude bands of a fixed range of latitude. The system selectively analyzes the latitude band data to locate objects to be processed. For each object type, the objects within a latitude band are sorted and analyzed from west to east. The present system also includes a seeded scenery system. Various levels of seeds, each seed size referring to the size of the area covered by each seed are used. The seeded scenery system provides background scenery only when no other scenery is available to overwrite it. The system also includes a dynamic overlay management system which, when it loads a routine into memory, rewrites the line of code which called the routine to be a call directly to the location of the routine which is now in memory.

32 Claims, 9 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

□ 38. Document ID: US 5513303 A

L5: Entry 38 of 46

File: USPT

Apr 30, 1996

US-PAT-NO: 5513303

DOCUMENT-IDENTIFIER: US 5513303 A

TITLE: Moving an object in a three-dimensional workspace

DATE-ISSUED: April 30, 1996

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Robertson; George G.	Palo Alto	CA		
Mackinlay; Jock	Palo Alto	CA		
Card; Stuart K.	Los Altos Hills	CA		

US-CL-CURRENT: 345/419; 345/427, 345/473, 345/679

## ABSTRACT:

In response to user signals requesting motion of a displayed object, a system presents a sequence of images, each including an object perceptible as a moved continuation of the previously displayed object. The user can independently request radial motion and lateral motion, and the system presents a sequence of images in which the object is displaced radially by the requested radial motion and laterally by the requested lateral motion. The user can request lateral motion by operating a mouse and can request radial motion by operating keys on a keyboard, with one key requesting motion toward a radial source and another key requesting motion away from the radial source. The radial source can be the viewpoint. The object's motion toward the viewpoint includes two phases. In the first phase, the object follows an acceleration path, enabling the user to control motion near its starting point and providing increasingly rapid motion; in the second phase, it follows an asymptotic path, enabling the user to control its motion as it approaches the viewpoint and preventing it from passing the viewpoint. The displacements between positions on the asymptotic path can follow a logarithmic function, with each displacement a proportion of the distance from the previous position to the viewpoint. The phases can be produced by using the logarithmic function to clip an acceleration function. The same rate of acceleration can be applied when the user requests motion away from the viewpoint. The processor can perform an animation loop, each step of which receives user signals and presents another image.

32 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

39. Document ID: US 5446834 A

L5: Entry 39 of 46

File: USPT

Aug 29, 1995

US-PAT-NO: 5446834

DOCUMENT-IDENTIFIER: US 5446834 A

\*\* See image for Certificate of Correction \*\*

TITLE: Method and apparatus for high resolution virtual reality systems using head tracked display

DATE-ISSUED: August 29, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Deering; Michael	Los Altos	CA		

US-CL-CURRENT: 345/427; 345/419, 345/848

ABSTRACT:

A method and apparatus for accurate head-tracked stereo display on a workstation CRT is disclosed that corrects inaccuracies caused by CRT optical properties. The correction includes modification of a viewing matrix equation to adjust the physical coordinates of a display window. An alternative correction models the CRT surface as multiple flat "patches" positioned and titled to approximate the spherical or cylindrical shape of the actual screen, and each patch is rendered separately with a patch-specific viewing matrix. Another alternative correction uses angle of view information obtained directly with eye tracking, or indirectly through a "hot spot" determination to bias correction at the point of viewing.

10 Claims, 8 Drawing figures

Exemplary Claim Number: 6

Number of Drawing Sheets: 6

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Detailed Description](#) | [Claims](#) | [KWMC](#) | [Draw. Ds](#)

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40. Document ID: US 5359703 A

L5: Entry 40 of 46

File: USPT

Oct 25, 1994

US-PAT-NO: 5359703

DOCUMENT-IDENTIFIER: US 5359703 A

TITLE: Moving an object in a three-dimensional workspace

DATE-ISSUED: October 25, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Robertson; George G.	Palo Alto	CA		
Mackinlay; Jock	Palo Alto	CA		

Card; Stuart K.

Los Altos Hills

CA

US-CL-CURRENT: 345/419; 345/427, 345/474, 345/850, 345/953, 345/959, 345/960

ABSTRACT:

In response to user signals requesting motion of a displayed object, a system presents a sequence of images, each including an object perceptible as a moved continuation of the previously displayed object. The user can independently request radial motion and lateral motion, and the system presents a sequence of images in which the object is displaced radially by the requested radial motion and laterally by the requested lateral motion. The user can request lateral motion by operating a mouse and can request radial motion by operating keys on a keyboard, with one key requesting motion toward a radial source and another key requesting motion away from the radial source. The radial source can be the viewpoint. The object's motion toward the viewpoint includes two phases. In the first phase, the object follows an acceleration path, enabling the user to control motion near its starting point and providing increasingly rapid motion; in the second phase, it follows an asymptotic path, enabling the user to control its motion as it approaches the viewpoint and preventing it from passing the viewpoint. The displacements between positions on the asymptotic path can follow a logarithmic function, with each displacement a proportion of the distance from the previous position to the viewpoint. The phases can be produced by using the logarithmic function to clip an acceleration function. The same rate of acceleration can be applied when the user requests motion away from the viewpoint. The processor can perform an animation loop.

16 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Assignee](#) | [Attorney](#) | [Claims](#) | [RQMC](#) | [Draw. De](#)

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41. Document ID: US 5287437 A

L5: Entry 41 of 46

File: USPT

Feb 15, 1994

US-PAT-NO: 5287437

DOCUMENT-IDENTIFIER: US 5287437 A

TITLE: Method and apparatus for head tracked display of precomputed stereo images

DATE-ISSUED: February 15, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Deering; Michael	Los Altos	CA		

US-CL-CURRENT: 345/427; 345/419

ABSTRACT:

A method and apparatus for generating complex 3D stereo images in response to real time viewer head movement by dynamically accessing pairs of stereo images selected from among a precomputed set of images. The precomputed images correspond to a

predetermined set of possible viewpoints, and are accessed based upon a prediction of viewer head movement. The arrangement of predetermined viewpoints may be along one, two, or three dimensions.

16 Claims, 13 Drawing figures  
Exemplary Claim Number: 9  
Number of Drawing Sheets: 9

Full Title Citation Front Review Classification Date Reference [View](#) [Edit](#) [Delete](#) [Claims](#) [EPOC](#) [Draw. D.](#)

42. Document ID: US 5222204 A

L5: Entry 42 of 46

File: USPT

Jun 22, 1993

US-PAT-NO: 5222204  
DOCUMENT-IDENTIFIER: US 5222204 A  
\*\* See image for Certificate of Correction \*\*

TITLE: Pixel interpolation in perspective space

DATE-ISSUED: June 22, 1993

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Swanson; Roger W.	Fort Collins	CO		

US-CL-CURRENT: 345/427; 345/426, 345/606

## ABSTRACT:

A method and apparatus for interpolating pixels to be displayed on a display screen so as to account for the nonlinearity of distance changes in the perspective projection of a 3-D object onto the display for corresponding linear distance changes in 3-D world space. Each pixel of an input polygon to be displayed on the display screen is given a perspective value in world coordinates for each display point, and this value is passed through the graphics processor along with the shading parameters associated with the each display point. The respective shading parameters for each display point are then scaled by the perspective value for each display point to account for the effects of perspective foreshortening of the displayed object on the display screen. Since no translation to world coordinates is required for the perspective scaling, fast hardware circuitry may be used. The rendered image of the invention has much improved color accuracy since the shading more closely reflects the effects of changing perspective in world space.

14 Claims, 5 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 3

Full Title Citation Front Review Classification Date Reference Claims KMC Drawn D

43. Document ID: US 4987527 A

US-PAT-NO: 4987527  
 DOCUMENT-IDENTIFIER: US 4987527 A

TITLE: Perspective display device for displaying and manipulating 2-D or 3-D cursor, 3-D object and associated mark position

DATE-ISSUED: January 22, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hamada; Tomoyuki	Ibaraki			JP
Kamezima; Kohzi	Ibaraki			JP
Takeuchi; Ikuo	Ibaraki			JP
Watanabe; Yuriko	Tokyo			JP

US-CL-CURRENT: 700/64; 345/157, 345/162, 345/427

ABSTRACT:

A manual operating system for manually operating a pattern displayed on a screen of a graphics display device, which is included in the manual operating system so as to display generated patterns comprises perspective projection means for displaying the cursor, object and mark in perspective projection on the basis of information supplied from cursor information storage means and object information storage means.

8 Claims, 13 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 8

[Full](#) | [Title](#) | [Citation](#) | [Front](#) | [Review](#) | [Classification](#) | [Date](#) | [Reference](#) | [Abstract](#) | [Claims](#) | [KWMC](#) | [Drawn D](#)

44. Document ID: US 4866637 A

US-PAT-NO: 4866637  
 DOCUMENT-IDENTIFIER: US 4866637 A

TITLE: Pipelined lighting model processing system for a graphics workstation's shading function

DATE-ISSUED: September 12, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Gonzalez-Lopez; Jorge	Red Hook	NY		
Hempel; Bruce C.	Tivoli	NY		
Liang; Bob C.	West Hurley	NY		

US-CL-CURRENT: 345/426; 345/427, 345/506

**ABSTRACT:**

A lighting model processing system for a computer graphics workstation's shading function includes multiple floating point processing stages arranged and operated in pipeline. Each stage is constructed from one or more identical floating point processors. The lighting model processing system supports one or more light sources illuminating an object to be displayed, with parallel or perspective projection. Dynamic partitioning can be used to balance the computational workload among various of the processors in order to avoid a bottleneck in the pipeline. The high throughput of the pipeline system makes possible the rapid calculation and display of high quality shaded images.

27 Claims, 6 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference	DOI	Document	Download	Claims	ICMC	Drawn
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□ 45 Document ID: US 4734690 A

L5: Entry 45 of 46

File: USPT

Mar 29, 1988

US-PAT-NO: 4734690

DOCUMENT-IDENTIFIER: US 4734690 A

TITLE: Method and apparatus for spherical panning

DATE-ISSUED: March 29, 1988

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Waller; William G.	Portland	OR		

US-CL-CURRENT: 345/427

## ABSTRACT:

A graphics display terminal performs a pan operation with respect to a view motion center to effectuate spherical panning, thereby providing perspective and non-perspective views. Three dimensional instructions stored in terminal memory are re-transformed in accordance with a panned direction. Also a zoom feature is provided so that displayed images may be magnified as desired.

12 Claims, 4 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference	DOI	Journal	Volume	Page	Claims	KMPC	Drawn Date
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46. Document ID: US 4677576 A

L5: Entry 46 of 46

File: USPT

Jun 30, 1987

US-PAT-NO: 4677576

DOCUMENT-IDENTIFIER: US 4677576 A

\*\* See image for Certificate of Correction \*\*

TITLE: Non-edge computer image generation system

DATE-ISSUED: June 30, 1987

**INVENTOR-INFORMATION:**

NAME	CITY	STATE	ZIP CODE	COUNTRY
Berlin, Jr.; Edwin P.	Berkeley	CA		
Gardner; Geoffrey Y.	Centerport	NY		
Gelman; Robert M.	Great Neck	NY		
Gershowitz; Michael N.	Plainview	NY		

US-CL-CURRENT: 345/420, 345/421, 345/427, 345/582, 345/643, 348/123, 434/43

**ABSTRACT:**

A computer image generation system is described which models objects without the necessity of linear edges. The system is adaptable for dynamic (real time) image generation from a compact model base for use in, for example, flight training systems. Scene content is enhanced by a novel texture generator. The system is designed for use with standard video display equipment.

43 Claims, 18 Drawing figures

Exemplary Claim Number: 1,36

Number of Drawing Sheets: 6

Full Title Citation Front Review Classification Date Reference [View](#) [Edit](#) [Delete](#) [Details](#) [Claims](#) [KMC](#) [Draws](#)

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